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With the present volume the Editorship of the Canadian Entomologist passes into new hands. The retiring editor has for some years been conscious of the necessity for this change, owing to the increasing demands on his time of his University duties, which have made it difficult for him to give as much attention to his editorial work as it deserves. It is gratifying, therefore, to know that this work will pass into such capable hands as those of our esteemed colleague, Dr. James McDunnough, of the Dominion Entomological Branch, Ottawa. Dr. McDunnough needs no introduction to the readers of the Canadian Entomologist. His numerous publications on the North American Lepidoptera, among the most important of which are the well-known "Contributions to the Natural History of the Lepidoptera of North America" and the "Check List of the Lepidoptera of Boreal America" have placed him in the front rank of students of this order, and since his appointment to the Dominion Entomological Branch he has extended his activities in several other directions.

In resigning from his office the retiring editor wishes to thank his many friends among our contributors, whose services have been the main source of our journal's continued success, and with whom correspondence has been both a pleasure and a profit.

POPULAR AND PRACTICAL ENTOMOLOGY.

THE LIFE-HISTORY OF A HOBBY HORSE.*

BY FRANCIS J. A. MORRIS,
Peterborough, Ont.

PART II. BOY AND MAN—SAPLING GROWTH.

You may easily guess how little London had of attraction for either Slyboots or Merry Andrew; and instead of seeking after the Babylonish gods therein enshrined, we laboured day by day to recreate the childhood world of our delight. In this, with a fair share of luck and the help of some wise and benevolent elders, we were largely successful.

From the very first our young natures shied like roe deer at the city, snuffing the air and stamping uneasily; and this instinctive distrust we soon nursed into a wholesome hate that grew steadily with the years. London, we both agreed, was nothing but a howling wilderness, and for two reasons only could we ever be induced willingly to enter this arid waste; either to rush out at the other side of it on the northern express, or to visit the great oasis at the heart of the desert—the Zoological Gardens.

Yet another district did indeed form the objective of certain long and dreary pilgrimages, on which we were dragged periodically by the Olympians, to the National Exhibitions, those monstrous displays of human industry and

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inventiveness; but these left only nightmare recollections of footsoreness and headache, so that the name of Kensington brought a bad taste to the mouth, till one memorable day when we discovered, patiently waiting just round the corner for us there, the great Natural History Museum, and at the door, ready to unlock its treasure-house before two pair of the most excited eyes in all London that day, our old Scotch neighbor, donor of the famous Peacock butterfly.

But for the "Zoo," midsummer day itself was all too short, and this in spite of its having had long leagues of lee-way to make up in the affection of one of us. As a boy of eight or nine I had been taken there once before, and the recollection was anything but pleasant. We all have, even in adult life, our off-days, when we are at loggerheads with the whole world and the universe flies to 6's and 7's. At such times the boy of eight appears "possessed" and goes about not merely tempting fate, but actually goading the imps of vengeance into fury. On the wariest urchin that ever played in Tom Tiddler's ground fall sooner or later humiliation and the heavy hand of outraged propriety. On this occasion our superstitious Scotch nurse, with grave shaking of the head, would have pronounced me "fey" and come nearer the mark, I verily believe, than the matter-of-fact Sassenach who declared I had got out at the wrong side of the bed that morning. Whether I had or not I cannot remember, and all I know for certain is that things went wrong from the very start. Long before breakfast I sallied out into our host's garden and tested the blade of a new knife on the stem of a valuable creeper that was being trained up the side of the house; from here I made my way into the barnyard and tried to teach some young ducks to swim under water, so that when "Joe" the farmhand came to their rescue, two of them were at the last gasp with upturned eyes. Finally, being dared by one of my cousins to vault over the widest part of the duck pond, I essayed the impossible; my pole stuck upright in the middle of the pond and I slid ingloriously down into a watery bed of chickweed and had to be rushed into the carpenter's shop to be dried out, surreptitiously, in time for the train journey. When taxed by my uncle, on reports from the indignant custodians of garden and barnyard, and confronted with a long list of acts of wanton mischief—most of them undeniably a true bill—I burst out laughing in his face; it was then, I suppose, that the avenging Furies took me and the situation in hand.

Retribution came with anything but halting gait. Arrived at the Zoo, I must needs choose a Bactrian beast instead of the camel to have a ride on. Camels were too ordinary, we had seen them at the circus and they had only one hump; besides my brother had chosen the camel, so nothing would do but I must be hoisted up between the two hairy humps of this queer looking squealing quadruped for my ride. But alas! the brute was ill-tempered and bolted from its keeper; before it could be rounded up I got pretty badly shaken and worse frightened. My brother witnessed this whole scene of my discomfiture with huge delight from the back of a docile camel, and his ill-concealed grins on my tearful return were more than I could stand. After fiercely denying that I had been a bit afraid, I managed to break away from the rest of the party to do some sight-seeing for myself instead of providing a spectacle for others.

Where all the jungle and prairie life of the tropics were gathered into a single park, one didn't have to go far for thrilling adventures; indeed, one was fairly jostled on all sides by weird-looking foreigners, such as anteaters, tapirs,

peccaries, yaks and gnus, and I had already had several very exciting *tête à têtes* when I spied a heavily built shaggy sort of antelope—like an African wildebeeste in the centre of a large barred cage, staring intently at me with full, soft, gazelle-like eyes; this gentle, melting gaze drew me to the bars in a kind of fascination, and the llama (so I found it was called) came slowly forward as though to be petted; suddenly, at short range, it spluttered out full in my face a deluge of sour-smelling bread mash—having secretly stowed away this ammunition as cud in the top story of its stomach.

Fortunately, there were no witnesses to this second humiliation and I soon regained my composure. But the rest of the day lives mainly in my memory as a long and dreary succession of disagreeables deepening into horror, in which screeching parrots, chattering apes, and the dumb tragedy of live rabbits fed to coiled staring serpents, figure prominently. On the way home, to cap it all, I had the misfortune to sit down in the railway carriage on my very latest toy, a box of gaily coloured tin ducks and fish that would swim about if you wielded over them the magic wand of a little steel magnet; the glass lid caved in, and two of my aquatic treasures, a green carp and a mandarin drake, met in fatal embrace that reduced them both to a shapeless crumple of painted tin.

However, that day of disasters had long vanished from the scene, and nothing untoward marred the re-appearance of the Zoo in our boyhood's drama. And when we, later, discovered the South Kensington Museum, this formed an even stronger attraction, and many a happy hour did we spend in that fairy land of Natural History. Two other places we unearthed in London where it was just possible for self-respecting humanity to eke out an existence not wholly miserable. In a dingy street of Camberwell where "Mourning Cloaks" (*Vanessa antiopa*) had once flown in the fabulous past, we discovered—sole survival of this age of myth—an ancient dealer in butterflies and moths, setting-boards, cork, pins, and nests of little wooden ointment boxes in which to store our captures. Nearer home still, at Herne Hill, under the sooty arch of a railway viaduct stood a fancier's shop with a most extensive assortment of pets, and often after school we would hurry over to make a purchase.

I don't suppose we had any Quixotic notion of inoculating all London with the serum of rusticity, but we certainly made a most heroic effort to cure our own little suburban corner of all its ailments by a healthy transfusion of country blood; we fairly filled the back yard with white rats, mice, rabbits, Belgian hares, guinea pigs, and pigeons; while in every spare room and corner of the house itself we staked claims for swarms of tiny squatters; caterpillars striped and spotted, smooth, horned and hairy, butterflies and moths, dragonflies, beetles and spiders, were constantly escaping from their glass-lidded confines to disturb the calm of Olympus. We had even in one of the bedrooms an active industry of bird-stuffing and pelt-curing that has long mouldered away in my memory to a confused tangle of wire, cotton-wool, cayenne pepper and scalpels.

The district of West Dulwich in the early eighties still retained no small tang of the country about its atmosphere. There were traces here and there, within a stone's throw of our house in unoccupied fields, muddy pools, and decrepid old willows, of what had once been a sparkling meadow-brook flowing past the old-fashioned residence of Rosendale Hall, which tradition averred

had been the favorite hunting lodge of Queen Elizabeth; and, indeed, astride the back of that letter "n" in the middle of the word "Rosendale," the curious linguist may wing his way back not merely to the days of Good Queen Bess, when doubtless the place was still a valley of roses, but to a time in Old England long before Chaucer when the plural of "rose" was "rosen."

East of us the wooded estates of Edward Alleyn, Shakespeare's friend and fellow actor, were not yet all built over. There were still shady slopes on Gypsy Hill, and though the gypsies with their picturesque tents had vanished forever before a standing army of red and yellow brick houses, the nightingale still sought its ancestral home there among the trees each spring and made music in the land. Beautiful woods still flourished near the Crystal Palace at Sydenham, and an oak grove within the school playground itself, where the voice of the earliest cuckoo might be heard and even its elusive form spied in stealthy flight from tree to tree.

In that same ground, quite close to the Chatham and Dover railway I got my first sight of gaily spotted newts in a neglected clay pond, and once caught in the long grass a beautiful green lizard. It was from here too that I gathered, feeding in a clump of small-headed purple thistles, part of a colony of Black-spined caterpillars to rear at home. The list of British butterflies is a very meagre one compared with that of a great continent like North America, and even of that meagre list quite a number of species were unknown in our part of Scotland. There was frantic joy in the house when these dark thorny caterpillars, after a short pupation emerged into the most beautiful "Painted Ladies" (*Vanessa cardui*). One of the most amazing things to watch was the way they shot out a secretion of pink milk at emergence, squirting it over their wings to saturate them before the work of unfolding and stretching could be safely embarked on.

The whole neighborhood was largely residential; the houses all had gardens enclosed by fences of narrow oak lattice overlapping vertically and topped with a narrow coping of the same; shade-trees—mostly elm, poplar, willow and linden—abounded about the roads; many of the gardens boasted trees and shrubbery, and these wooden fences made a surprisingly good cover for insects at all stages; but, especially, I recall the number and variety of chrysalids to be found in the angle of the coping. We used to tramp the sidewalks for miles, running our eye along this groove by the hour, once in a while glancing down the vertical lines just to take the crick out of our neck and corral any stray game that we might have overlooked on the surface of the fence.

Among other captures made in this way, I recall the Goat Moth, the Leopard Moth, the Lappet and Oak-egger. The Goat Moth (*Cossus ligniperda*) was a large dark-grey creature, whose larva bores in willow and poplar, has a lurid brown-crimson hue, an evil odor, and the enviable reputation of having been eaten by the Romans; we often saw the dark-brown gutterings, like trickles of tobacco juice, at the mouth of their burrows in the poplar trunks. There is in Ontario a closely related genus of the Cossid family in the common *Prionoxystus robiniae*, which I found abundant one summer on Trout Island in the Rideau and occasionally about Port Hope, infesting poplars more often than the locust tree; the Cossus itself occurs in two species of North America, *Cossus centerensis*, a small moth of the Atlantic States, and *Cossus undosus* of the Rockies. The

Leopard Moth (*Zeuzera pyrina*) also belongs to the *Cossidae* and has recently become established on Long Island, as a borer in maple and elm. The Oak-Egger and the Lappet are both of the genus *Gastropacha* and closely akin to the moths of our Apple and Forest Tent caterpillars, all of them being members of the family *Lasiocampidae*.

On our next door neighbor's hedge of lime trees we early took two prizes that filled us with delight, though both subsequently proved to be common; one was the handsome Lime Hawk Moth or Sphinx (*Smerinthus tiliae*) and the other the beautiful Buff Tip Moth (*Phalere bucephala*), whose gregarious larvæ used to crawl down in marshalled hosts to the fences and side walks; this belongs to the family *Notodontidae*, and is next of kin to the famous Puss and Lobster Moths, the extraordinary caterpillars of which were both destined to cross our path at rare intervals, throwing the lucky finder into transports of joy.

Over one of our own garden fences grew a dense mass of ivy, and here, at rest or on the wing we caught many new kinds of day- and dusk- or night-flying moths; the Yellow Underwing, Swallow-tail, Brimstone, Ermine, Currant, and Vapourer are some that I recall; the female of the last was wingless like a penguin, and the caterpillar a very pretty creature, though its tufts of yellow, and the red-and-black floating hairs that we admired proclaim it to have been of the ill-omened tussock brood.

A favourite pastime was net-wielding in the garden at night, and one of the most vivid of these 37-year-old memories is our first encounter with the Ghost Moth (*Hepialus lupulinus*): the male of this creature has a glistening white lustre on the upper surface of its wings and a neutral-tinted yellow-brown on the under; its flight is swift and irregular like a snipe's; in its zig-zag course it presents, now the upper, now the under surfaces of its air-planes in baffling alternation, one moment a dazzling beacon and the next blotted out in some inky pool of darkness; had its position in space been constant like that of a fixed star, or its orbit regular as a planet's we might have tracked it down with the certainty of the rotary lamp on Eddystone Lighthouse, but as it was it would twinkle here and flash again there with all the eccentricity of a runaway comet. Our final capture of this elusive will-o'-the-wisp was a supreme triumph like the landing of a first sea-trout The Rev. J. G. Wood explains in his "Common British Moths," that it is on settling only that the insect disappears, but —*experto crede*—we knew better; while in full flight across an open lawn, at six or eight feet from the ground, it would often disappear and reappear in a single second of time.

(To be continued.)

APPOINTMENT TO ENTOMOLOGICAL BRANCH, OTTAWA.

Dr. F. C. Craighead, late of the Bureau of Entomology, Washington, D.C., arrived at Ottawa at the beginning of the New Year to take up his duties as Entomologist in the Division of Forest Insects. The Branch is very fortunate in securing the services of Dr. Craighead, on account of his wide experience and training.

DRAGONFLIES OF THE LAKE OF BAYS REGION.

BY J. McDUNNOUGH, PH. D.*
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The period from June 28th, to July 15th, of the summer of 1920 was spent by myself at Norway Point on the Lake of Bays. Considerable collections of insects were made, rather particular attention being paid to the Odonata and allied orders. A list of the species of Odonata taken would appear to be of interest not only as a supplement to Dr. E. M. Walker's reports on the Odonata of Algonquin Park and the Go Home Bay region, but also on account of the fact that several species new to our Canadian lists were observed and the known northern range-limit in such instances considerably extended.

The Lake of Bays region is in general topography very similar to that of Algonquin Park or the Muskoka Lakes. Along the shores of the Lake of Bays proper few dragonflies were observed, but the smaller lakes and ponds proved to be quite rich in species. The main collections were made (1) around Black Lake, a small tranquil lake, just south of the Norway Point golf links, with heavily wooded, precipitate shores, except at a few points at the northern end where the ground was flatter and a considerable growth of sedges and water lilies was to be found; (2) at a small marshy pond on the Baysville road, which I have designated Brown's Brae Pond, and which I unfortunately only discovered during the latter half of my sojourn.

Twenty-six species in all were captured; the following list is probably far from exhaustive, but will at least serve as a basis for further investigations.

ZYGOPTERA.

Coenagrionidæ.

1. *Lestes eurinus* Say.

   Four males of this unmistakable species were taken on July 11th among the sedges at Brown's Brae Pond. As far as can be ascertained from the available literature, this constitutes a new record for our Canadian fauna.

2. *Lestes rectangularis* Say.

   One teneral male was taken on June 24th on a wooded slope rather remote from any body of water.

3. *Lestes disjunctus* Selys.

   A series of more or less teneral males and females was captured on July 11th and 14th around Brown's Brae Pond.

4. *Agria moesta putrida* Hagen.

   Only a single female was taken at Black Lake on July 1st. Two males were captured on July 28th, 1919, on a road skirting the Lake of Bays east of Norway Point.

5. *Enallagma hageni* Walsh.

   Common around Black Lake and Brae Pond, June 23rd to July 8th. A number of the males showed the fifth abdominal segment suffused with black for at least half its length, a feature not noticed in our Ottawa specimens of this species; no difference in genitalia, however,

*Contribution from Ent. Br. Dept. of Agr., Ottawa.

could be detected between these darker forms and the normal one, which also occurred in the same localities.

6. *Enallagma cyathigerum* Charp. (*annexum* Hag.)

One male, June 23rd, Black Lake; taken along with the following species. The genitalia correspond exactly with Williamson's figure of *annexum* in Ent. News, XI, pl IX. Walker records a single male from Go Home Bay (1915, Suppl. 47th Ann. Report, Mar. and Fisheries Branch, 66) so that the occurrence of the species in the present region is not unusual.

7. *Enallagma calverti* Morse.

Both sexes very common in copula around the Brae Pond, July 11th to 14th; a few specimens were also captured at Black Lake in June.

8. *Enallagma aspersum* Hag.

Ten males and one female of this dark-bodied species were taken around the Brae Pond on July 11th. The species does not appear to have been previously recorded from Canada, but the similarity of genitalia of the male specimens to Needham's figure (Bull. 68, New York Sta. Mus., pl. XIX) renders the reference fairly certain.

9. *Nehallenia irene* Hag.

Common during the first half of July in the sedges bordering Brown's Brae Pond, but easily overlooked on account of the low flight and small size.

10. *Chromagrion conditum* Hag.

A single male was taken, June 23rd, at Black Lake. No further specimens were seen, although diligent search was made on subsequent dates.

11. *Ischnura verticalis* Say.

Extremely common all through the season at both places.

ANISOPTERA.

Aeshnidæ.

12. *Gomphus exilis* Selys.

Common along the shores of Black Lake, June 20th to July 1st.

13. *Gomphus spicatus* Hag.

One female taken along with *G. exilis*, June 28th, belongs apparently to this species rather than to *sordidus*, judging by the remarks of Kellicott (Odonata of Ohio) and Williamson (Dragonflies of Indiana) and their descriptions of vulvar laminæ.

14. *Basiæschna janata* Say.

One male, July 1st, and one female, June 20th; others were observed flying over the waters of a shallow inlet of the Lake of Bays.

15. *Aeshna canadensis* Wlk.

Common during July around Brown's Brae Pond and vicinity but difficult to capture. Three males were taken.

Libellulidæ.

16. *Didymops transversa* Say.

Three males and two females were taken June 23rd, July 1st, patrolling along a moist road through a rather dense wood, busily

engaged in capturing mosquitoes. The species was not seen in any other situation.

17. *Tetragoneuria cynosura simulans* Muttk.

One of the commonest species of the district and on the wing during the whole period of my stay. It frequents the borders of woods and open meadows, seldom alighting but tirelessly patrolling to and fro in search of food.

18. *Cordulia shurtleffi* Scud.

Not rare, early in July, on the edges of woods in semi-shady places; it is not a strong flier and is easily recognized on the wing by the brilliant green colour of the eyes. Only males were captured.

19. *Libellula exusta julia* Uhl.

Very common in June and early July on the margin of lakes and ponds, frequently resting on dead logs.

20. *Libellula incesta* Hag.

Three males and two females captured, July 1st and 10th; the species was not uncommon along the shores of Black Lake, the males darting from their resting places for short excursions and returning to sit in their characteristic attitudes on either tree-trunk or twig. Walker (op. cit. p. 92) records the species from Go Home Bay; evidently it has a more widespread northern range than has heretofore been supposed.

21. *Libellula quadrimaculata* Linn.

Quite rare in this region; only two males were captured on the border of woods near Black Lake.

22. *Leucorrhinia frigida* Hag.

Five males were taken, July 11th, among the sedges bordering Brown's Brae Pond.

23. *Leucorrhinia proxima* Cal.

Four males were taken along with *L. frigida*. The species is fond of resting on half-submerged logs and is then not difficult to capture. The pruinose suffusion on the dorsum of the males extends in this species over the fifth abdominal segment whilst in all specimens of *frigida* examined this segment remains black.

24. *Leucorrhinia glacialis* Hag.

One male, taken with the other species of the genus. On the wing it at once strikes the eye by the brilliant red coloration of the base of the abdomen.

25. *Leucorrhinia intacta* Hag.

One female was taken on the roadside, June 20th, near the Brae Pond. Apparently the flight of the species was at this time already almost over.

26. *Sympetrum obtrusum* Hag.

The species was just beginning to emerge, July 11th to 14th, at the Brae Pond. A single pair only was captured but later in the month the species would doubtless become commoner, along with others of the genus.

SYNOPSES OF THE ANTHOMYIID GENERA MYDÆA, OPHYRA, PHYLLOGASTER, TETRAMERINX, AND EULIMONOPHORA (DIPTERA).

BY J. R. MALLOCH,
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The genus *Mydæa* as here limited is essentially northern in its distribution, most of the species being found in the extreme northeast and northwest, with a few occurring as far south as Texas, though rarely. Stein lists about 300 species in this genus, but very few indeed of the species so listed really belong to the genus as I have discovered by examining a great number of the species involved. Most of the species he lists as belonging to this genus from North America belong to *Helina*. The other genera dealt with in this paper have but few representatives in this country, and two of them, *Tetramerinx* and *Phyllogaster*, are unknown from the old world.

Mydæa Robineau-Desvoidy

This genus is distinguished from its allies by having the third wing-vein setulose at base, fourth not curved forward at apex, hind tibia without calcar, penultimate abdominal sternite in female with a number of short bristles, eyes of male subcontiguous, prealar bristle present, prosternum bare, face not buccate.

KEY TO SPECIES.

MALES.

1. Legs largely or entirely black; knobs of halteres black or brown except in *calvicrura*.....2.
   Legs with the exception of the tarsi, and sometimes part of the fore femora, yellowish testaceous; knobs of halteres pale.....4.
2. Eyes with dense hairs; halteres pale yellow.....*calvicrura* Coquillett.
   Eyes bare; halteres black or brown.....3.
3. Arista with the longest hairs as long as width of third antennal segment; wings slightly infuscated throughout.....*obscura* Stein.
   Arista with the longest hairs not longer than its basal diameter; wings slightly brownish, the bases of veins orange yellow.....*rugia* Walker.
4. Scutellum largely or entirely yellow, contrasting sharply with the colour of disc of thorax.....5.
   Scutellum coloured as disc of thorax.....7.
5. Palpi yellow, antennæ almost entirely so.....*flavicornis* Coquillett.
   Palpi black, antennæ almost entirely so.....6
6. Hind femur without bristles on posteroventral surface except at extreme apex.....*occidentalis* Malloch.
   Hind femur with a series of long, fine, rather closely placed bristles on apical half of posteroventral surface.....*pagana* Fabricius.
7. Antennæ entirely black; longest hairs on arista at least as long as width of third antennal segment; fore femora infuscated except in *discimana*.....8.
   Second antennal segment brownish yellow; longest hairs on arista not as long as width of third antennal segment; claws of fore tarsus not as long as apical tarsal segment; fore femora yellow.....*persimilis* Malloch.

8. All femora largely fuscous; hind tibia with one strong and sometimes one weak anteroventral bristle; prealar bristle minute; wings not yellow at bases ..... *obscura* Stein.
   At most the fore and mid femora infuscated; wings yellow at bases, or dorsum of thorax indistinctly vittate ..... 9.
9. Small species, 5.5 to 6.5 mm. in length; thorax and abdomen with distinct but not very dense pruinescence, the former distinctly vittate only in front; prealar bristle very small ..... *winnemanna* Malloch.
   Larger species, 7 to 9 mm. in length; thorax and abdomen with dense yellowish pruinescence, the former with very distinct vittæ ..... 10.
10. Fore femora yellow; second antennal segment brown; prealar bristle one-third as long as the one behind it ..... *discimana* Malloch.
    Fore femora infuscated; second antennal segment black; prealar bristle over half as long as the one behind it ..... *urbana* Meigen.

FEMALES.

1. All femora largely or entirely black ..... 2.
   Femora reddish yellow, sometimes the fore pair brownish or fuscous in part ..... 6.
2. Eyes distinctly hairy ..... *calvicrura* Coquillett.
   Eyes bare ..... 3.
3. Arista with its longest hairs not longer than its basal diameter ..... *rugia* Walker.
   Arista with its longest hairs as long as or longer than width of third antennal segment ..... 4.
4. Third antennal segment distinctly less than 4 times as long as its greatest width; mid and hind femora entirely or almost entirely black or fuscous ..... 5.
   Third antennal segment at least 4 times as long as its greatest width; mid and hind femora, and especially the latter very indistinctly infuscated ..... *winnemanna* Malloch.
5. Calyptræ white; tibiæ yellowish testaceous ..... *obscura* Stein.
   Calyptræ orange yellow; legs entirely black ..... *obscurella* Malloch.
6. Scutellum largely or entirely yellow, contrasting sharply with the disc of mesonotum ..... 7.
   Scutellum black, concolorous with disc of mesonotum ..... 9.
7. Palpi and antennæ yellow ..... *flavicornis* Coquillett
   Palpi entirely, antennæ largely black ..... 8.
8. Humeral angles of thorax broadly yellow ..... *occidentalis* Malloch.
   Humeral angles of thorax coloured as disc ..... *pagana* Fabricius.
9. Apical segment of fore tarsus disclike, as broad as long; fore tibia with a median posterior bristle ..... *discimana* Malloch.
   Apical segment of fore tarsus normal, about twice as long as wide ..... 10.
10. Arista densely short-haired, the longest hairs barely as long as its basal diameter; fore tibia with 1 posterior and 1 postero-ventral bristle ..... armata mg. *armatipes* n. n. (*armipes* Malloch nec. Stein).
    Arista with long hairs, the longest of which are at least as long as width of third antennal segment, or the fore tibia with or without one bristle ..... 11.

11. Arista with its longest hairs barely longer than its basal diameter.....*persimilis* Malloch.
Arista with its longest hairs, longer than width of third antennal segment.....*urbana* Meigen.

Ophyra Robineau-Desvoidy

There are but two species of this genus known to me as occurring in America one of which, *leucostoma*, occurs in Europe and in Canada and all over the United States, though less common in the south. The other species is confined to the southern United States in North America, but extends through Central and South America. The larvæ feed in latrines and in manure.

KEY TO SPECIES.

1. Males.....2.
Females.....3.
2. Hind tibiæ much curved, ventral surfaces with long, soft hairs which are longest just basad of middle; calyptræ fuscous; palpi black.....*leucostoma* Wiedemann.
Hind tibiæ but little curved, ventral surfaces with decumbent setulose hairs; calyptræ yellow; palpi ferruginous.....*aenescens* Wiedemann.
3. Calyptræ subfuscous, the margins darker; palpi black; hind tibia with 3 to 6 anteroventral bristles.....*leucostoma* Wiedemann.
Calyptræ yellow; the margins concolorous; palpi ferruginous; hind tibia with 1 or 2 anteroventral bristles.....*aenescens* Wiedemann.

Tetramerinx Berg.

KEY TO SPECIES.

1. Legs black, bases of tibiæ and extreme apices of femora reddish; abdomen with a dark dorsocentral vitta; face, parafacials, and cheeks white, almost silvery; wings milky, veins brown; hind tibia with three or four anterodorsal bristles.....*unica* Stein.
Legs black, all of tibiæ and extreme apices of femora reddish yellow; abdomen with black dorsocentral vitta and lateral spots; face, parafacials, and cheeks brownish or bronzy; wings slightly grayish, veins dark brown; hind tibia with two anterodorsal bristles.....*californiensis* Malloch.

Phyllogaster Stein

KEY TO SPECIES.

1. Males.....2.
Females.....4.
2. Mid femur with some long, strong bristles on basal half of antero- and posteroventral surfaces; hind femur with rather widely placed bristles on entire length of anteroventral surface; abdomen with dorsocentral vitta and lateral spots; mid tibia with an anterodorsal bristle.....*robusta* Johnson.
Mid femur without anteroventral bristles on basal half; hind femur with a few strong bristles on apical half of anteroventral surface; mid tibia without an anterodorsal bristle.....3.

3. Abdomen with dorsocentral vitta and more or less distinct lateral black spots; hind tibia with 1 anteroventral bristle; the pair of long bristles on basal portion of hypopygium widely separated, much closer to lateroposterior margin than to central cleft; processes of fifth sternite as broad as long.....*cordyluroides* Stein.

   Abdomen with only a more or less distinct dorsocentral vitta, the lateral spots absent; hind tibia with two anteroventral bristles; the pair of long bristles on basal portion of hypopygium rather closely placed, much closer to central cleft than to lateroposterior margin; processes of fifth sternite longer than broad.....*littoralis* Malloch.

4. Hind femur with rather widely spaced bristles on entire length of anteroventral surface; apical genital segment with two strong thorns; scutellum with numerous setulose hairs on entire upper surface.....*robusta* Johnson.

   Hind femur with strong bristles only on apical half of anteroventral surface.....5.

5. Apical genital segment with two strong thorns; hind tibia with one anteroventral bristle; scutellum with a number of setulose hairs on disc.....*cordyluroides* Stein.

   Apical genital segment with four strong thorns; hind tibia with two anteroventral bristles; scutellum very rarely with more than two discal setulæ.....*littoralis* Malloch.

Eulimnophora Malloch

This genus is represented by many species in Africa.

KEY TO SPECIES.

1. Thorax conspicuously vittate; palpi and tibiæ largely yellowish.....*dorsovittata* Malloch.

   Thorax inconspicuously vittate; palpi black; tibiæ black, sometimes yellowish at bases.....2.

2. Large species, normally over 4 mm. in length; hind femora in both sexes with from 3 to 6 bristles on apical half of anteroventral surface, the space basad of these with weak decumbent hairs.....*arcuata* Stein.

   Smaller species, less than 4 mm. in length; hind femora in both sexes with a series of short erect bristles, which are rather closely placed, from base to apex on anteroventral surface, the apical two or three much longer than the others.....*cilifera* Malloch.

Xenocœnosia Malloch

KEY TO SPECIES.

1. Males.....2.

   Females.....4.

2. Large species, 4.5 mm. in length; abdomen without glossy bare areas on sides of third and fourth tergites; hind femur without dense, soft hairs on ventral surfaces, the antero- and posteroventral surfaces with long, black bristles which are unequal in lengths, the longest one on anteroventral surface about one-third of the femoral length from apex.....*major* Malloch.

Smaller species, 3.5 mm. in length; abdomen with a large, glossy, bare area on each side of third and fourth tergites; hind femur with dense, soft hairs on ventral surfaces, and with or without a fine bristle near apex on anteroventral surface, no other bristles on this surface.....3.

3. Antennæ entirely pale yellowish testaceous; apical scutellar bristle almost or quite as long as the lateral pair; one bristle near apex of anteroventral surface of hind femur very distinctly stronger than the rather short ventral pale hairs.....*calopyga* Loew.

Antennæ with the exception of apex of second segment and base of third black; apical scutellar bristles much weaker than the lateral pair and shorter; apical bristly hair on anteroventral surface of hind femur hardly distinguishable from the very long, pale ventral hairs.....*floridensis* Malloch.

4. Hind femur without a bristle near apex on anteroventral surface, the one nearest apex about one-third from it.....*major* Malloch.

Hind femur with a bristle very near apex on anteroventral surface.....5.

5. Second antennal segment and basal half of third yellowish; apical pair of scutellar bristles little shorter than laterals.....*calopyga* Loew

Antennæ except extreme base of third segment black; apical pair of scutellar bristles very much shorter than lateral pair.....*floridensis* Malloch.

ANNOTATED CHECK LIST OF THE MACROLEPIDOPTERA OF ALBERTA—ADDITIONS, 1919.

BY KENNETH BOWMAN,
Edmonton, Alta.

The following additions to my "Check List of the Macrolepidoptera of Alberta," published by the Alberta Natural History Society (Edmonton, 1919) were made during the season of 1919.

The abbreviations are the same as those employed in the Check List. The numbers before the names are those of Messrs. Barnes and McDunnough's "Check List of the Lepidoptera of Boreal America, 1917." The numbers after the names indicate the months in which the insects have been taken. The capital letters are abbreviations of the localities of capture, as follows: E, Edmonton; R, Red Deer; G, Gleichen; P, Pocahontas; N, Nordegg; B, Banff; Bm, Blairmore.

33	*Pieris occidentalis calyce* Edw	4	E.P.
57	*Eurymus hecla glacialis* McLach	6	N.+
59	" *eriphyle autumnalis* Ckll	5–6	E.B.N.R.
64	" *christina pallida* Ckll	7	N.R.
	" *christina gigantea* Stkr	7	E.N.R.
157	*Argynnis leto* Behr	7	Bm.
185	" *bischoffi* Edw	7-8	P.N.
211	*Euphydryas nubigena beani* Skin	7	P.
283	*Vanessa virginiensis* Dru	7	E.
407	*Heodes helloides florus* Edw	7-8	E.N.R.
794	*Pseudohazis eglanterina* Bdv	6	Bm.
1076	*Melaporphyria immortua* Grt	5	E.

1275	*Euxoa infracta* Morr	8 Bm.
1315	" *quinquelinea lutulenta* Sm	9 Bm.
1339	" *campestris* Grt	8 E.
1986	*Rancora brucei* Sm	6 N.
2137	*Graptolitha ferrealis* Grt	4 E.
2380	*Luperina passer conspicua* Morr	7 E.
2513	*Merolonche ursina* Sm	6 N.
N.S.	*Autographa diversigna* Ottol	7 N.+
N.S.	" *interalia* Ottol	8 E.N.
3333	*Syneda alleni saxea* Hy. Edw	6 Bm.
3712	*Olene willingi* B. & McD	7 E.
3972	*Coryphista meadi* Pack	6 7 Bm.
3999	*Dysstroma cervinifascia* Wlk	7 N.
4017	*Hydriomena renunciata* Wlk	5–6 E.
4208	*Eupithecia albicapitata* Pack	7 E.
4332	*Philobia ulsterata* Pears	6 E.
4349	*Macaria purcellata* Tayl	7 N.
4465	*Caripeta divisata* Wlk	7 E.
4489	*Pygmæna simplex* Dyar	7 N.
N.S.	*Loxostege albertalis* B. & McD	7 G.
5032	" *commixtalis* Wlk	6-7 B.N.
5051	*Diasemia plumbosignalis* Fern	7 N.
5088	*Phlyctænia ferrugalis* Hbn	6 E.
5135	*Pyrausta fumoferalis* Hlst	6 E.

ADDITIONAL RECORDS OF DRAGONFLIES FROM THE OTTAWA REGION.

BY J. MCDUNNOUGH, PH. D.*
Entomological Branch, Dept. of Agriculture, Ottawa.

The following species of Odonata, not recorded in Dr. E. M. Walker's paper (1908, Ottawa Nat. XXII, 16) have been taken by me this past summer in this region.

Zygoptera.

Enallagma calverti Morse.

Common, June 3rd, at Mackay Lake, Rockliffe.

Enallagma carunculatum Morse.

Not uncommon, July 28th on the shore of Leamy Lake, Hull, Que.

Coenagrion resolutum Selys.

Taken along with *E. calverti* on June 3rd.

Anisoptera.

Gomphus descriptus Banks.

One male was captured along Meach Brook, June 13th, about 1½ miles from the railway station of Cascades, Que.

Gomphus spicatus Hag.

Two males, June 3rd, Mackay Lake, Rockliffe.

*Contribution from Ent. Br. Dept. of Agr., Ottawa.

FOUR NEW SPECIES OF MELYRIDÆ (COLEOPTERA).

BY FRANK E. BLAISDELL, SR.,
Stanford University.

It has been recognized for a long time that the species of *Eschatocrepis*, inhabiting principally southern California, possesses pale legs while those from the coastal regions of central California have blackish legs, and as a whole are more deeply pigmented. Casey has mentioned differences observed by him in specimens from San Diego and Santa Barbara. The following species is described at the present time:

Eschatocrepis nigripes, new species.

Form elongate. Colour deep black, more or less shining; antennæ dark rufo-piceous; tibiæ and tarsi rufo- to nigro-piceous. Surface microscopically reticulate. Pubescence short, sparse and more or less grayish. Head not quite as wide as the pronotal apex; front slightly convex, impressions feeble. Second joint of the antennæ subglobular, about as long as wide; fifth joint scarcely triangular, although a little more anteriorly prominent than the contiguous joints. Pronotum slightly wider than long; sides parallel, not strongly arcuate in basal half, broadly sinuate in the apical half behind the apical angles which are moderately small and rather prominent laterally; basal angles obtuse, not rounded nor prominent; base feebly rounded; apex broadly arcuato-truncate and prominent anteriorly in middle four-sixths, laterally oblique and somewhat posteriorly declivous to the angles; disk more or less impressed in the median line, submarginal line strong, surface impressed on the lateral declivity at the sinuations, punctures small and sparse, densely granulato-punctate laterally. Elytra scarcely wider at base than the widest part of the pronotum, about two and two-thirds times longer than the width at base; sides more or less slightly divergent posteriorly, punctuation rather fine, scarcely sparse, surface very feebly rugoso-reticulate; apex slightly serrulate, apical margin somewhat explanate. Abdomen subglabrous, very finely sculptured, punctures denser and finer at apex of the fifth segment.

Male.—More elongate and narrower. Sides of the elytra scarcely divergent posteriorly, apex broadly and very gradually rounded to apex. Fifth ventral abdominal segment transversely truncato-sinuate in middle two-fourths of the apex, lateral fourths oblique and set with a row of stiff marginal hairs; angles rather prominent on their ventral surface and bearing a tuft of slightly longer hairs, intervening apical surface slightly declivous.

Female.—Relatively shorter behind and more dilated. Fifth ventral with a feeble but distinct, rounded emargination, angles raised and distinctly prominent on their ventral surface, forming the sides of the feebly impressed and declivous intervening surface.

Length 2.3–3.2 mm.; width .7–1.3 mm.

Type locality.—Sausalito, Marin County, California.

Holotype, male, and allotype, female, in my own collection. Paratypes in the collection of the California Academy of Sciences.

Habitat.—California (Sausalito and Fairfax, Marin County, April 26th, Leona Heights, Alameda County, May 5th.

It seems necessary to give the above phase a distinctive name, on account of colour, genital characters and other minor differences. It frequents the blossoms of the wild morning glory (*Convolvulus*); it is rather abundant. In *Eschatocrepis constrictus* Lec. the legs are pale and, as a whole, the insect is much less pigmented than *nigripes*.

Casey in his Coleopterological Notices, VI, p. 460, Annals N. Y. Acad. Sci., VIII, July, 1895, created the genus *Eudasytes* for three species which he deemed advisable to separate from *Trichochrous*, the essential difference being the rather wide, flat and horizontal epipleura, and the lateral margins of the elytra narrowly reflexed. The apical angles of the pronotum are usually stronger and more prominent anteriorly than in any species of *Trichochrous*, except a few species like *suturalis*, for instance. I see no reason why *Eudasytes* should not be recognized as a valid genus. At the present time I will describe three new species as follows:

Eudasytes reynoldsi, new species.

Form broad, oblong, about twice as long as wide. Colour black; antennæ piceous, more or less rufo-piceous in basal half; legs rufous to rufo-testaceous; surface rather shining. Pubescence not long, abundant but not hiding the body surface, grayish to subluteo-cinereous in colour and recumbent; pronotal margin fimbriate, fimbriæ erect and of moderate length, not conspicuous; those of the elytral margin similar and obliquely directed; head, pronotum and elytra with stiff, semi-recumbent, sparsely placed and not long nor conspicuous blackish setæ. Head rather small, about two-thirds as wide as the pronotal apex, sparsely to almost densely punctate, punctures moderate in size; surface broadly impressed just between the antennæ, impression more definitely but briefly longitudinally marked laterally. Antennæ stout, joints five to eleven subequal in width, subserrate anteriorly. Pronotum widest at base which is about a third wider than the apex; length a little less than the width of apex; sides almost straight and convergent toward apex, margin subexplanate with the adjacent discal surface almost grooved; apex broadly and deeply emarginate between the anteriorly prominent, rather wide, broadly and evenly rounded apical angles. At the angles the margin is somewhat reflexed and the discal surface distinctly grooved within; base rather broadly arcuate at middle, oblique laterally to become sinuate within the large, prominent and more or less everted angles which are subobtuse at tip; margins of the angles rather reflexed; surface quite deeply impressed within; disk quite strongly convex centrally and anteriorly, slightly impressed within the angles and along the margins, punctures moderate, separated by a distance equal to three or five times their diameter, denser laterally, surface almost separate within the angles. Elytra about a half longer than wide, moderately convex, but somewhat flattened on the disk; humeri prominent, dentiform, everted and obtuse, umbone prominent and rounded; margin somewhat explanate, finely serrulate, arcuately reflexed with the surface rather broadly channelled within, especially at the humeri, broadly rounded at apex, sutural angles rounded; punctuation rather sparse, much coarser toward the base than at apex. Abdomen densely punctate.

Male—More broadly oblong; pronotum broader and larger, basal angles more strongly developed Humeri broadly dentiform.

Female.—Head and pronotum smaller, basal angles of the latter and humeri less strongly developed.

Length 4.0 mm.; width 1.75–2.0 mm.

Type locality,—Truxton Valley, Mohave County, Arizona, June, altitude 4,205 feet; J. A. Kusche collector.

Holotype, male, in my own collection. Allotype, female, and a male paratype, in the collection of L. R. Reynolds, to whom I dedicate the species.

Eudasytes grandicollis, new species.

Form large, stout and oblong, about twice as long as wide. Colour black, pronotum shining; legs rufo-ferruginous; antennæ piceous, rufous toward the base. Pubescence dense on the elytra, sparse and not hiding the surface on the head and pronotum; cinereous, slightly fulvous with a subsericeous lustre, recumbent and moderately long, sparsely intermixed with erect pale setæ, which are more abundant and blackish on the head and pronotum; marginal pronotal fimbriæ pale, moderately long and rather close-set, those of the elytra longer, less fimbriform and not as close. Hairs rather dense on the body beneath. Head moderately large; front not convex, broadly bi-impressed; punctures sparse and rather small, although somewhat coarse on the vertex. Antennæ stout and not extending to the middle of the pronotum, subserrate anteriorly from the fourth joint, where the angles are rounded and somewhat tumid Pronotum large in both sexes, transversely oblong, less than a fourth wider than long; sides parallel, broadly and evenly arcuate, sometimes slightly sinuate or straight just before the basal angles, the latter obtuse and distinct; lateral marginal bead distinctly reflexed; apex broadly and arcuately emarginate, a little narrower than the base and with a distinct reflexed bead; apical angles prominent anteriorly, large, rather broad and narrowly rounded; base broadly and strongly arcuate in middle three-fifths, thence subsinuate to the angles; disk strongly arcuate at the periphery, less so in the broad central area, punctures small and very sparse, surfaces smooth and shining; a distinct submarginal, gutter surrounds the entire disk, rather wide at apex (male) and distinctly widened at the angles, surface somewhat impressed at basal sinuations. Elytra about a third longer than wide; sides parallel, apex rounded laterally but subtruncate at the suture, angle narrowly rounded, marginal bead rather broad and reflexed, especially behind the humeri, the latter with a distinct umbone; disk moderately convex from side to side, punctures small, rather closely placed, surface somewhat rugose. Marginal gutter rather broad, especially near the humeri. Epipleura broad, horizontal almost to the extreme apex, impunctate and without pubescence, except toward the base. Margins convergent on the apical curve. Abdomen finely and rather densely punctate. Legs relatively slender.

Male.—Rather stouter. Pronotum large and heavy. Fifth ventral transversely truncate at apex.

Female.—Head rather smaller. Pronotum smaller. Fifth ventral broadly but strongly rounded at apex.

Length 4.0–4.6 mm.; width 1.7–2.2 mm.

Type locality.—Tonopah, Nevada.

Holotype, male, and allotype, female, in my own collèction. Paratypes in the collection of the California Academy of Sciences.

Forty-eight specimens studied. A moderate series was collected at Tonopah Nevada, by my mother-in-law, Mrs. E. C. Peek; a similar series was taken at Goldfield, Nevada, by Mr. F. W. Nunenmacher. The species was collected June 29th, 1907, from the blossoms of an undetermined plant.

A large species related to *amplus* Casey and *oblongus* Casey by the horizontal epipleura, which extends to the extreme apex of the elytra. *Grandicollis* appears sufficiently distinct and inhabits a different region from Casey's species.

Eudasytes hirsutus, new species.

Form oblong, about two and a third times longer than wide, moderately convex. Colour deep black and shining; femora nigro-piceous, tibiæ rufo-piceous, tarsi almost rufous; antennæ rufous or rufo-piceous toward base and piceous distally; mouth-parts more or less rufous. Pubescence brownish-gray and sparse; subrecumbent hairs about a third as long as the long flying hairs which are bristling throughout, sparse and equally distributed over the elytra and pronotum; marginal fimbriæ of the pronotum and elytra long, blackish and not close set. Head moderately large, front scarcely convex, feebly bi-impressed, with a small, smooth feebly convex area near the apical margin; punctures small, irregular and sparse. Antennæ rather stout, subserrate anteriorly, angles blunt and rounded, last three joints noticeably thick. Eyes finely setigerous, setæ short. Pronotum transversely oblong, about a fourth wider than long; sides, subparallel, slightly convergent, almost straight, feebly arcuate, anteriorly broadly and very feebly sinuate posteriorly, margin rather thick; apex broadly emarginate, subtruncate in middle third, not at all beaded; apical angles rather broad, anteriorly prominent and rather more than narrowly rounded; base arcuate in middle third, broadly and feebly sinuate laterally, margined and with a submarginal groove; basal angles rectangular to almost less than a right angle and somewhat prominent laterally; disk broadly and less than moderately convex, most so centrally, slightly impressed at the apical and basal angles, puncture rather coarse, sparse, denser at the angles, smaller in the central area, interstitial surface shining and glabrous. Elytra rather less than twice as long as wide, punctures sparse, not sharply defined, surface more or less rugulose; margin slightly reflexed, rather narrow and with a distinct but narrow gutter; sutural angles rounded. Epipleura horizontal, moderately wide, inflexed at apex at the beginning of the apical curve, inner margin evanescent without convergence to the outer margin; gradually widened from the humeral angles. Abdomen finely punctured, pubescence denser and recumbent.

Male.—Comparatively less broad. Basal pronotal angles more prominent laterally, tips not rounded. Fifth ventral abdominal segment truncate, sometimes slightly impressed at middle of the apex so as to appear feebly sinuate.

Female.—Broader and stouter. Basal angles of the pronotum less prominent and slightly blunt.

Length 2.5–3.5 mm.; width 1.0–1.6 mm.

Type locality.—Tonopah, Nevada.

Holotype, male, and allotype, female, in my own collection; paratypes in the collection of the California Academy of Sciences. Twenty-four specimens

studied. Taken by Mr. F. W. Nunenmacher in July from the blossoms of an undetermined species of plant.

Hirsutus approaches *oblongus* Casey from Utah. It cannot be the same. In the latter the apical angles are acute, pronotum finely punctate, frontal impressions pronounced, legs pale rufo-ferruginous, sides of the pronotum extremely feebly arcuate from base to apex. In *hirsutus* the epipleura are inflexed apically and it therefore agrees with *ursinus* Casey. The specimens of *hirsutus* before me constitute a very homomorphic series and vary only in size.

NOTES ON THE LIFE-HISTORY OF PACHYPSYLLA CELTIDIS-GEMMA RILEY.

BY HARRY B. WEISS,
New Brunswick, N. J.

This species, which was described by Riley in 1884 (Proc. Biol. Soc. Wash. II, p. 74) is locally common in New Jersey, the nymphs forming galls on the twigs of hackberry (*Celtis occidentalis*). These polythalamous galls are deformations of the young buds. They are variable in size and irregular in shape but always bud-like or subglobular and appearing as if formed by a conglomeration of small nodules. Van Duzee (Cat. of Hemiptera, 1917) lists it as occurring in New Jersey, New York, D.C., Va., Ia., Mo., La. and Texas.

The galls are always formed on the new wood and in severe infestations almost every bud is deformed. Each swelling contains from 1 to many cells each of which harbours a nymph. A gall 2 mm. in diameter was found to consist of 1 cell; one of 5 mm. contained 7 cells; one of 8 mm. had 19 cells; one of 9 mm. contained 24 cells and another of 10 mm. had 22 cells. These cells are grouped so that each has a part of the outside wall of the gall covering it. The cells are irregularly oval to subcircular in shape and vary considerably, depending on the sizes of the nymphs occupying them. Galls containing only a few nymphs appeared to have relatively larger cells.

Overwintering takes place in the last nymphal stage, these nymphs emerging through somewhat irregular to regular elliptical openings in the wall of the gall during the last few days of May and the first half of June. These nymphs crawl on the tops of the galls and to the twigs and adults emerge shortly afterward. During the first two weeks of June at Riverton, N. J., where most of the observations were made, adults were plentiful on the stems and leaves of hackberry. Feeding appears to take place chiefly on the petioles of the leaves and on the tender stems, the adults resting head downward. Copulation and egg deposition occur shortly after emergence. Females reared in a cage deposited eggs before taking any other nourishment except that afforded by the dry stems, which was apparently next to nothing. The eggs are deposited on their sides on the lower leaf surface close to a vein or in the angle formed by two veins. Sometimes they are found on the developing shoots or in crevices around the bases of leaf petioles. They are held fast to the leaf or other surface by means of a short backward projecting stipe, arising near the basal end, which is inserted in the tissue. The basal part of the leaf, where the pubescence in the vein angles is thick appears to be a favoured place for eggs. Many eggs are deposited singly and many in groups ranging from 2 to 8 or 10.

It is not known how long it takes for the eggs to hatch. First stage nymphs were not found in the buds until July 20. At this time the buds were not appreciably deformed. From this it appears that over two weeks are necessary. After hatching the nymphs make their way to the small developing buds, crawling between the folded parts and locating in a spot between the centre and the outside of the bud. At first the young nymph is somewhat greenish, but later assumes a yellowish tinge. On September 1, or over a month later an examination of numerous well-defined galls showed nymphs in all stages of growth except the first and the last stages. By the middle and last of September many last stage nymphs were found.

The cells containing the nymphs appeared to be unevenly and thinly lined with a white cottony material. This material increased in bulk as the last stage was approached, and cells containing nymphs of this stage usually had quite a pad of material on that part of the cell directly over the back of the nymph. The hairs on the dorsal part of the body also were covered with the cottony down.

The nymphs collected during the season were easily arrangeable into 5 stages based on their size, but the exact number of instars is not known, due to the difficulty of keeping the same nymph under observation throughout the season. Brief descriptions showing development of the nymphs, are given below. The bodies of the nymphs of all stages are capable of considerable distension, and specimens showing the same dimensions of the head and wing parts vary greatly in the sizes of their bodies, due no doubt to the amount of food in them at a given time.

In addition to the references to this species which are given in Van Duzee's Catalogue, the following one may be noted—Felt., Key to American Insect Galls, N. Y. State Mus. Bull. 200, 1917 (1918), p. 23, fig. 127.

Egg.—Length 0.3 mm. Width 0.1 mm.

Pearly white, smooth, elongate sub-pyriform, rounded at basal end and tapering to acute point at opposite end which bears a fine hair about ⅓ as long as the egg. Widest across basal third. A short, backward projecting stipe arises from near the basal end.

First nymphal stage. Length 0.3 mm. Width of head between eyes 0.1 mm.

Colour lemon yellow; oval, broadest across thorax, abdomen tapering slightly; body flat dorsally or slightly convex, segmentation indistinct. Antennæ whitish, short, projecting; eyes red; median dorsal light line running through head and thoracic segments. Dorsal surface of head evenly and lightly browned, posterior to this area are 2 transverse light brown bands on the thorax and posterior to these bands are many fine transverse brown lines on the abdomen. Lateral edges of abdominal segments bearing minute spines; last abdominal segment terminated dorsally by a comparatively larger spine. Dorsal body surface bearing several fine, short, erect hairs. Outer surfaces of legs lightly browned. Ventral surface lemon yellow. Rostrum extending to second pair of legs, lancets 1½ to 2 times length of body.

Second nymphal stage. Length 0.4 mm. to 0.55 mm. Width of head between eye 0.18 mm.

Yellowish, broadest across thorax. Somewhat similar to first stage except that the dorsal brown markings are faint or absent; anterior margin of head truncate; sides of thorax arcuate; abdomen more elongate, sides rounded and extrem-

ity abruptly tapering to point; dorsal hairs more pronounced; abdominal segmentation more distinct. Legs whitish. Sizes of individuals vary greatly. Some specimens suboval in outline, many elongate, some with greatly distended bodies.

Third nymphal stage. Length 0.7 mm. to 0.8 mm. Width of head between eyes 0.26 mm. Form elongate.

Lemon yellow to orange with faint transverse dorsal markings. Antennæ and legs whitish. Thorax subquadrate; sides of abdomen subparallel or strongly arcuate, with pointed tip. Sides of 2nd and 3rd thoracic segments slightly produced laterally and somewhat posteriorly. Extremity of abdomen brownish. Segmentation more distinct than in preceeding stage. Extremity of abdomen terminating in 2 minute spines or processes directed upward. Dorsal surface of body especially posterior portion of abdomen bearing numerous fine erect hairs.

Fourth nymphal stage. Length 0.91 mm. to 1.34 mm. Width of head between eyes 0.38 mm. Shape somewhat similar to that of preceeding stage.

Somewhat chunky. Colour lemon yellow with faint transverse orange markings. Last 3 abdominal segments closely united and brownish. Antennæ whitish with faint brownish bands. Thorax subquadrate, sides of abdomen strongly arcuate. Insect widest across abdomen. Abdomen flat or subglobular. Wing-pads whitish, much more prominent and larger and strongly directed laterally and slightly posteriorly. Legs whitish, articulations dark. Hairs on head, thorax and abdomen more pronounced, those on abdominal segments long and arranged in transverse rows.

Fifth nymphal stage. Length 1.8 mm. to 2.3 mm. Width of head between eyes 0.6 mm. to 0.7 mm. General colour yellowish with faint orange to red transverse markings. Wing pads, legs, last three abdominal segments brownish. Antennæ sparsely hairy, about as long as width of head and banded alternately with white and brown. Eyes prominent, lateral, red. Head transverse with an irregular brown spot on dorsal surface either side of middle. Thorax subquadrate in distended specimens. Wing-pads of meso- and metathorax extending posteriorly to second abdominal segment. Abdomen subglobular, sides strongly arcuate. Body widest across abdomen. Abdomen consisting of 8 segments, last 3 strongly chitinized, dark brown, terminating in a point; abdominal segmentation pronounced, except in last 3 segments which appear to be somewhat fused. Abdominal segments 6, 7 and 8, especially 7 and 8, bearing numerous minute tubercles each bearing a hair. Anal segment consists of a horny process bearing minute teeth or tubercles at its base. Dorsal surface of body, especially posterior part of abdomen, bearing fine white hairs. Legs brownish, light on ventral surfaces. Tibiæ bearing several minute spines and hairs. Ventral surfaces of thorax and abdomen yellowish or yellowish red except for several pairs of median, brownish abdominal spots and the dark markings of last three segments. Rostrum extending to between 1st and 2nd pairs of legs, tip dark.

During the last of May and first part of June the dorsal surface becomes bluish green with orange to red markings. Together with the dark areas, this gives a very attractive appearance to the nymph. The abdomen swells, becomes circular in outline, and the narrowest part of the body is across the 1st abdominal segment. The first 5 abdominal segments become bulged and slight tubercular processes appear on the sides. Many of the specimens measure 3 mm. in length and 1.8 mm. across abdomen at this time.

SOME BRITISH FOSSIL INSECTS.

BY T. D. A. COCKERELL.
Boulder, Colorado.

Carabites scoticus, n. sp. (fig. 28.)

Elytron 5 mm. long, 2 mm. broad, inner basal corner rectangular, margins very slightly convex except at apex and outer base; ten striæ, not counting the inner absolutely marginal one, outermost stria marginal except near base, striæ appearing sharp, but under a high power seen to be weakly and closely punctate; third and fourth striæ (counting from inner margin) uniting at a distance from apex about five times as great as the distance between striæ.

Eocene rocks, Island of Mull, with a series of plants now being described by Professor A. C. Seward. The beetle elytron, which is in the collection at Cambridge University, will be recorded in Professor Seward's paper on the plants, but it seems best to describe it in an entomological journal. There are in the collection two other elytra, too imperfect to describe. One is at least very close to the above; the other is smaller, about 3 mm. long, weakly striate, and is apparently a weevil. *C. scoticus* is in general much like *Anchomenus fuliginosus* Pz., but it lacks the series of strong marginal punctures. It is quite distinct from the Eocene beetles of the south of England.

This is the first tertiary insect from Scotland to receive a name, but J. S. Gardner (Quart. Journ. Geol. Soc., XLIII, pl. XIII) figured a much larger elytron and a hind wing of an Homopterous insect from the I. of Mull beds.

Pseudosiricidæ.

Megapterites mirabilis Ckll. (Ann. Mag. Nat. Hist., March, 1920), from the Eocene of Bournemouth, is the only Tertiary representative of this family. It is a large insect, the anterior wing about 50 mm. long. Its nearest relative, apparently, is *Formicium* of Westwood, from the Lower Purbeck of Durdlestone

Fig. 26.

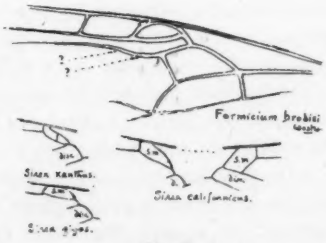

Fig. 27.

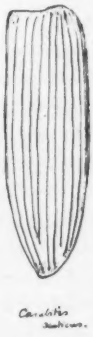

Fig. 28.

Bay. The type of *Formicium brodiei* Westw. is in the British Museum, where I have recently examined it. At the same time, the type of *Megapterites* was re-examined in company with Mr. Tillyard, whose keen eyes detected some features in the marginal cell which I had overlooked. After careful examination in a good light, following Mr. Tillyard's suggestions, I must agree with him that the marginal cell is closed and appendiculate at end, and has a cross nervure (in the manner of *Sirex*) not far from the base. It also appears that the original

figure of *Formicium* requires revision, and I give a new one, showing what can actually be seen. The dotted lines followed by ? are probably no more than folds or creases. Presumably there was at least one transversocubital nervure, but it could not be seen.

Comparing these wings with the modern Siricidæ, they are so close that it is not certain that a distinct family is indicated. Probably a subfamily, Pseudosiricinæ, contrasting with the living Siricinæ, would suffice for the fossils. *Formicium* appears to differ strikingly from *Megapterites* in the first submarginal cell, which is entirely separated from the first discoidal, and looks as if it belonged to the marginal series. In *Megapterites* the first submarginal is broadly sessile on the first discoidal, as in most Hymenoptera. The arrangement in *Xeris caudatus* Cress. is not very different from that of *Megapterites*, but *Sirex gigas* L. has the first submarginal separated from the discoidal, much as in *Formicium*. The marginal cell in *Sirex* may be distinctly closed, as in *Megapterites*, or may be open by the fading away of the apical region. A specimen of *Sirex xanthus* Cam. has the first submarginal touching the discoidal on both sides, and on one side the submarginal has a cross-vein, purely an aberration. But the most remarkable specimen is a *Sirex californicus* Norton, the two sides of which are very different, one having the first submarginal broadly sessile on the discoidal, the other having these cells separate. There are other abnormalities in the wings of this insect, but they do not concern our present problem.

THE ENTOMOLOGICAL SOCIETY OF ONTARIO—ANNUAL MEETING.

The Fifty-seventh Annual Meeting of the Entomological Society of Ontario was held at the Ontario Agricultural College, Guelph, on Wednesday and Thursday, November 17th and 18th, 1920, and was well attended, there being present, in addition to members and visitors from various Provinces and others from the staff of the College, several distinguished entomologists from the United States. The following members were present: Dr. E. P. Felt, State Entomologist, Albany, N. Y.; Rev. Prof. C. J. S. Bethune, Prof. L. Caesar, and Messrs. A. W. Baker and G. J. Spencer, O. A. College, Guelph; Messrs. A. Gibson, L. S. McLaine, H. G. Crawford, and E. Hearle, Dominion Entomological Branch, Ottawa; Prof. W. Lochhead, Macdonald College, Que.; Father Leopold, La Trappe, Que.; Mr. F. J. A. Morris, Peterborough, Ont.; Prof. E. M. Walker, Toronto, Ont.; Mr. W. E. Biggar, Hamilton, Ont.; Mr. Jas. Dunlop, Woodstock, Ont.; Mr. E. R. Buckell, Dept. of Agriculture, Victoria, B. C.; and the following officers of the Dominion Entomological Branch: Messrs. C. E. Petch, Hemmingford, Que.; W. A. Ross, Vineland Station, Ont.; H. F. Hudson, Strathroy, Ont., Norman Criddle, Treesbank, Man., and E. H. Strickland, Lethbridge, Alta. Among the visitors present were Prof. C. R. Crosby Cornell University, Ithaca, N. Y.; Messrs. W. R. Walton and L. H. Worthley Bureau of Entomology, Washington, D. C.; Mr. A. V. Mitchener, Manitoba Agricultural College, Winnipeg, Man.; Mr. A. H. McLennan, Dept. of Agriculture, Toronto; Mr. R. H. Gurst, Dominion Pathological Laboratory, St. Catharines, Ont.; and Professors R. Harcourt, J. E. Howitt, D. H. Jones and J. W. Crow, Dr. R. E. Stone, and Messrs. C. R. Klinck, and W. G. Garlick, O. A. College, Guelph, Ont.

On Wednesday a meeting of the Council was held, at which, among other matters discussed, it was decided to hold the next Annual Meeting at Toronto. A committee, consisting of the President, Dr. Walker and Mr. Baker, was appointed to consider the state of the Society's finances. The general session commenced at 1.30 p.m., the President, Mr. Arthur Gibson, occupying the chair. After the presentation of the Reports of the Council and the various officers and branches of the Society, the following papers were read:

Notes on Leaf Bugs (Miridæ) Attacking Apples in Ontario—Prof. L. Caesar.

The Manitoba Grasshopper Campaign, 1920—A. V. Mitchener.

Some Phases of the Present Grasshopper Outbreak in Manitoba—N. Criddle.

The Influence of Locusts on the Ranges of British Columbia (with lantern slides)—E. R. Buckell.

The Beet Webworm Outbreak of 1920—E. H. Strickland.

Paris Green should be discontinued as an Insecticide—Father Leopold.

The Present Status of the Hessian Fy in Western Ontario—H. F. Hudson.

Insects of the Season in Ontario—L. Caesar.

On Wednesday evening a meeting, in the form of a smoker, was held in the men's sitting room of the College Residence, at which Prof. Lochhead acted as chairman. The two principal events of the evening were a masterful address by Dr. Felt, entitled "Some of the Broader Aspects of Insect Control" and the third part of Mr. Morris's delightful "Life-history of a Hobby Horse." Both of these papers were much enjoyed by those present. Dr. Felt's paper was a very able presentation of his subject, while Mr. Morris captivated his audience by the charm of his language and delivery, and the fine scholarship and whimsical humour, which characterized his address. The meeting was enlivened by several musical selections played by the College Orchestra.

On Thursday morning the session was commenced with the election of officers for the ensuing year, with the following results:—

President—Mr. Arthur Gibson, Dominion Entomologist.

Vice-President—Mr. F. J. A. Morris, Peterborough.

Secretary-Treasurer—Mr. A. W. Baker, O. A. College, Guelph.

Curator and Librarian—Mr. G. J. Spencer, O. A. College, Guelph.

Editor—Prof. E. M. Walker, Toronto.

The following papers were then read:—

Further Evidence of the Effectiveness of Mercury Bichloride in the Control of the Cabbage Root Maggot in British Columbia.—R. C. Treherne and M. H. Ruhman.

Some Further Data on the Cabbage Maggot—L. Caesar.

Interrelations in Nature—W. Lochhead.

The Control of the Rose Midge—W. A. Ross.

Discussion of the European Corn Borer. This symposium was one of the chief features of this year's meeting. It was opened by Messrs. Arthur Gibson and L. S. McLaine on the outbreak of this pest in Ontario, and was followed by Messrs. L. Caesar, H. G. Crawford, W. R. Walton, L. H. Worthley and E. P. Felt.

Some Mosquito Problems in British Columbia—E. Hearle.

Wohlfahrtia vigil, A New Sarcophagid Parasite of Man—E. M. Walker.

Mailed January 31st, 1921.

PROF. E. M. WALKER, M. D.